The Edge Economic Update

Microchips and the U.S.-China Conflict

November 2025

Microchips and the U.S.-China Tensions

Executive Summary

Semiconductors—the silicon brains of everything from smartphones to satellites—have become the decisive terrain of twenty-first-century power. In 2024, the global semiconductor market surpassed USD 570 billion, and is projected to exceed USD 1 trillion by 2030, making chips a strategic asset comparable to oil in the last century.

Both Washington and Beijing now treat chips as vital to national security. Since 2022, the United States has imposed sweeping export controls restricting China's access to cutting-edge semiconductors and the tools to make them. These measures target chips below 7 nanometers, key AI processors, and high-end lithography systems, aiming to slow China's military-AI integration.

China, which imports roughly USD 430 billion worth of semiconductors annually—more than its crude-oil bill—has responded by investing over USD 150 billion in domestic chip manufacturing under its "Made in China 2025" and "National IC Fund" programs. By 2025, over 70 percent of Chinese chip funding comes from state or state-controlled sources.

The result is a "Silicon Cold War"—a race for technological sovereignty that is fragmenting global supply chains, raising production costs by an estimated 20–30 percent, and reshaping economic alliances across the Pacific.

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Background

In the 1990s, U.S. companies dominated nearly 40 percent of global semiconductor output. By 2021, that share had fallen below 12 percent, while East Asia—Taiwan, South Korea, Japan, and increasingly China—accounted for over 75 percent of global fabrication capacity.

Taiwan's TSMC alone manufactures around 90 percent of the world's most advanced chips (below 5 nm), making it a single-point-of-failure for global electronics. South Korea's Samsung leads in memory chips with roughly 45 percent of global DRAM production, while the Netherlands' ASML controls 100 percent of the market for extreme-ultraviolet (EUV) lithography machines.

When the U.S. placed Huawei on its entity list in 2019 and cut off its access to U.S. chips and software, it signaled the start of explicit tech decoupling. The decisive shift came in October 2022, when the Biden Administration barred Chinese firms from acquiring advanced logic chips below 14 nm and from accessing EUV lithography tools or U.S.-origin design software. By mid-2023, allied coordination with Japan and the Netherlands expanded these restrictions to nearly 80 percent of all high-end semiconductor tooling exports.

China's counterstrategy centered on self-sufficiency. Its Semiconductor Manufacturing International Corp. (SMIC) achieved a symbolic milestone in 2023 by fabricating 7 nm chips using modified older machines. Huawei soon followed with the Kirin 9000S processor—reportedly 30 percent slower than Apple's A16 but entirely domestically sourced.

These breakthroughs signaled that while U.S. measures slowed China's progress, they also galvanized its innovation drive.

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Key Insights

The Architecture of Control

U.S. export controls now restrict roughly 2,000 Chinese entities and bar any company using U.S. technology from supplying China with chips above defined performance thresholds. The October 2023 and December 2024 updates extended limits to AI accelerators exceeding 600 GB/s bandwidth and chips fabricated below 10 nm.

These curbs halted ASML's EUV shipments and restricted advanced DUV tools for Chinese fabs. Analysts estimate the rules could delay China's AI chip capabilities by five to seven years, while costing U.S. suppliers USD 10–12 billion in annual lost sales.

Initial Shock, Rapid Adaptation

Following the controls, Chinese chip imports plunged 23 percent YoY in early 2023, and domestic prices for GPUs surged over 40 percent. Yet within a year, China's top ten fabs increased utilization rates back to 80 percent, aided by aggressive government funding and procurement guarantees. Huawei's 2024 Mate 60 Pro smartphone used 85 percent Chinese-made components, compared to only 30 percent in 2019.

Meanwhile, U.S. and allied firms felt pain: China had accounted for 25–30 percent of revenue for major semiconductor equipment makers, forcing layoffs and price hikes across global supply chains.

China's Self-Reliance Campaign

China's 2024 budget earmarked USD 47 billion in new semiconductor subsidies, complementing the earlier USD 150 billion IC Fund. State support now covers nearly half of total investment in China's chip ecosystem. Domestic leaders are emerging:

- SMIC: expanding 7 nm production, targeting 5 nm by 2026.
- ChangXin Memory (CXMT): grew its DRAM output from 0 percent in 2018 to 5 percent global share in 2024, aiming for 10 percent by 2025.
- Biren Technology: developing domestic AI GPUs expected to reach 70 percent of Nvidia A100 performance.

Chinese universities now produce twice as many semiconductor-related research papers as their U.S. counterparts, and patent filings in advanced chip materials rose 35 percent YoY in 2024.

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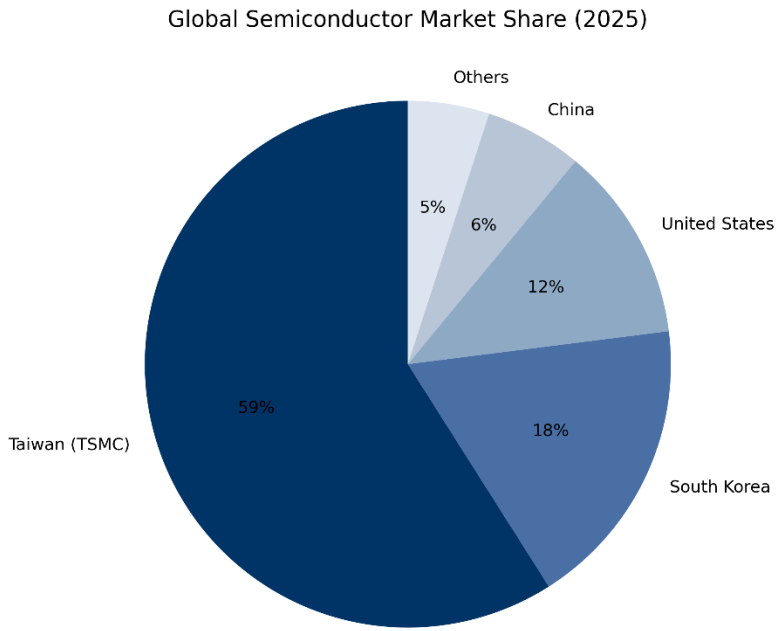

The global semiconductor manufacturing landscape remains highly concentrated. In 2025, Taiwan (TSMC) leads with 59% of total global chip fabrication, followed by South Korea (18%), the United States (12%), China (6%), and others (5%). This distribution highlights the strategic significance of East Asia in global supply chains and explains why semiconductor production has become a key geopolitical vulnerability in the U.S.–China rivalry.

Enforcement Challenges

Despite unprecedented restrictions, enforcement gaps remain. Reports indicate that over USD 500 million worth of high-end Nvidia A100 and H100 chips entered China in 2024 through third-party routes such as Singapore and Malaysia. Grey-market AI servers reportedly sold for premiums of 200–300 percent, showing persistent demand and porous enforcement.

The "Silicon Curtain" and Cost Inflation

The global semiconductor supply chain is reorganizing into regional blocs. The U.S. CHIPS and Science Act allocates USD 52.7 billion in incentives, including USD 39 billion for manufacturing grants and USD 11 billion for R&D. TSMC is investing USD 40 billion in its Arizona plants, Samsung USD 17 billion in Texas, and Intel over USD 20 billion in Ohio.

Europe's EUR 43 billion Chips Act aims for 20 percent global production share by 2030, though energy and labor costs remain 30–40 percent higher than in Asia.

China, meanwhile, continues to import around USD 350–400 billion in chips yearly but is replacing suppliers step by step. Producing chips in the U.S. costs about 30 percent more than in Taiwan, contributing to 5–15 percent price increases in AI hardware and GPUs.

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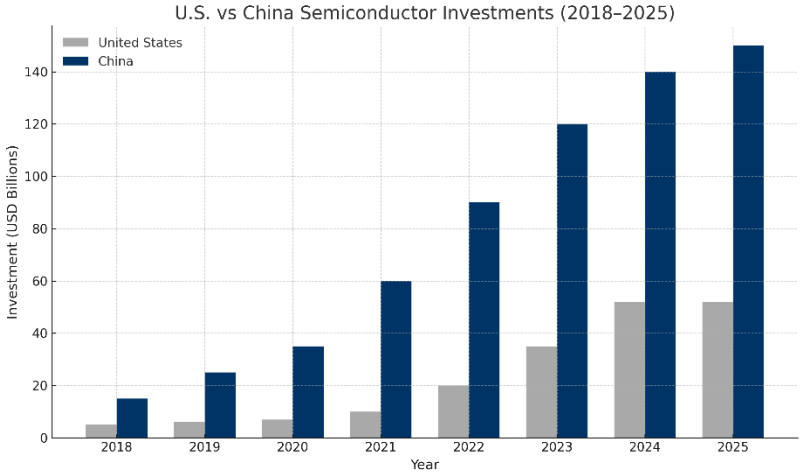

Between 2018 and 2025, China outpaced the United States in total semiconductor-related investments, allocating more than $150 billion through state-led programs and subsidies, compared to the $52 billion CHIPS Act and associated initiatives in the U.S. This disparity underscores the intensity of the race for technological independence, as both powers seek to reduce reliance on foreign chip ecosystems and secure strategic dominance in high-tech industries.

Partial Decoupling, Persistent Interdependence

Even as tensions escalate, total U.S.–China trade exceeded USD 575 billion in 2024, with semiconductors still a major category. The U.S. trade deficit with China fell from USD 383 billion to USD 295 billion between 2022 and 2024 but remains vast. Absolute decoupling is improbable; instead, selective separation is forming—AI, defense, and advanced chips decoupled; consumer electronics and mature nodes still intertwined.

Accelerated Innovation Race

TSMC announced prototype 2 nm chips with 15 percent speed and 30 percent energy efficiency gains over 3 nm nodes. China's researchers are exploring new architectures to bypass node constraints, including 3D stacking and multi-chip modules built on 28 nm fabs. Big Tech firms like Amazon, Google, Tesla, and BYD are now designing custom chips, diversifying global innovation centers and intensifying the talent race.

Security and Strategy Over Profit

For both Washington and Beijing, chips are strategic resources. U.S. officials consider controls a necessary trade-off for preserving military superiority. China frames self-reliance as economic survival. Analysts estimate that China's R&D spending in semiconductors will grow by over 18 percent annually through 2030, potentially doubling its domestic capacity by the end of the decade.

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Implications

Two Techno-Spheres

The world is tilting toward two distinct systems. The U.S. bloc (Taiwan, Japan, Korea, Europe) controls roughly 80 percent of advanced chip output and 90 percent of lithography tools. The China-centric bloc focuses on mid-tier and mature technologies above 14 nm, with an ambition to raise its domestic share from 17 percent in 2022 to 30 percent by 2027. Global companies increasingly need parallel designs and supply chains for each sphere.

Higher Costs, Slower Growth

Duplicated factories and redundant suppliers inflate capital expenditure. The Semiconductor Industry Association estimates a complete tech decoupling could erase USD 1 trillion in global GDP and raise average chip prices by 35–65 percent. Nonetheless, countries like Vietnam and India have seen electronics investment grow over 25 percent year-on-year since 2022 as companies diversify away from China.

Policy Versus Profit

Washington's security-first approach often conflicts with corporate interests: for some U.S. firms, China still represents 20–30 percent of sales. Likewise, China must weigh how far to retaliate without hurting its own manufacturers. The outlook is a "managed decoupling" — intense competition in strategic areas, continued trade elsewhere.

Innovation Fragmentation

The number of Chinese patents in semiconductors has tripled since 2015. Meanwhile, U.S. and allied R&D spending has risen to USD 190 billion annually, about 2.5 percent of total GDP across major participants. While the U.S. bloc leads in next-generation lithography, China may leapfrog in power electronics and new materials.

Resilience Through Redundancy

Concentration risk is finally being addressed: 92 percent of the world's most advanced chips currently come from Taiwan, a strategic vulnerability. By 2028, new capacity in the U.S., Japan, and Europe could cut that figure to around 60 percent, making supply chains less fragile to conflict or natural disaster.

Conclusion

The microchip contest defines this era's balance of power. Export controls have slowed China's advance by years but also accelerated its drive for independence. China now spends more on semiconductor imports than on energy, and its R&D machine is expanding at double-digit rates. The U.S. has rallied its allies to defend technological leadership, but at a price of higher production costs and supply chain complexity.

The world is entering a phase of selective decoupling—security before efficiency, redundancy before optimization. For business and policy leaders, this means strategies that embrace dual sourcing, regional manufacturing, and technology diversification. Microchips are no longer just components; they are currency of power.

Whether this "Silicon Cold War" solidifies into permanent fracture or settles into a stable equilibrium will depend on whether Washington and Beijing can compete fiercely while still managing their interdependence. Both sides have reason to avoid an economic meltdown that would shake a global market built on chips worth trillions. The coming decade will reveal if competition and coexistence can share the same circuit.

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